

WHAT IS CLAIMED IS:

1. A test method for discovering a polymer or polymer-forming component having improved properties, comprising the steps of
- 5 A) preparing one or more sets of polymer solutions or solutions of polymer-forming components of different composition in at least one sample preparation vessel,
- B) introducing a specified volume of the sets of polymer solutions or solutions of polymer-forming components into at least one sample vessel,
- 10 C) forming a polymer film, with or without further reaction of the polymers or the polymer-forming components,
- D) optionally exposing the polymer film to an increased temperature,
- E) determining, sequentially or in parallel, one or more physical properties,
- 15 F) selecting the polymer sample or the polymer-forming component resulting in the film having the most favorable properties.
2. The test method of Claim 1 comprising A) preparing at least 24 sample vessels.
- 20 3. The test method of Claim 1 comprising B) introducing not more than 500 μl of polymer solutions or solutions of polymer-forming components.
- 25 4. The test method of Claim 1 comprising C) forming a polymer film with a thickness of less than 500 μm .
5. The test method of Claim 1 comprising E) determining a property selected from the group consisting of degree of crosslinking, relative degree of crosslinking, hardness, gloss, solvent resistance, and crosslinking temperature.
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6. The test method of Claim 1 wherein the sample vessels have a substantially planar base.

5 7. The test method of Claim 1 comprising E) determining the crosslinking temperature of baking varnishes.

8. The test method of Claim 1 wherein the sample preparation vessel and/or the sample vessel is a part of a microtiter plate.

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9. The test method of Claim 1 wherein the physical property is the relative degree of crosslinking which is determined by steps comprising adding a dye to the solution during the preparation A) or introduction B) of the polymer solution or of the polymer component
15 solution and by carrying out the determination E) comprising the following steps:

G) overlaying the polymer film with a defined volume of organic solvent,

H) eluting the dye from the film over a specified activity period,

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I) taking a sample of the supernatant solvent at the end of the activity period and characterizing the amount of dye eluted by means of an absorption or fluorescence measurement.

25 10. The test method of Claim 1 wherein the physical property is the crosslinking temperature of the polymer or of the polymer components which is determined by steps comprising

(v) dissolving a fluorescent dye as a tag in the polymer solution or polymer component solution,

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(vi) preparing a plurality of coating films from the solution in different sample vessels and exposing the different sample

vessels to different temperatures,

(vii) overlaying the resulting polymer film with an organic solvent that swells the coating film and elutes the dye.

(viii) using the relative dye concentration of the eluates of the films baked at different temperatures to determine the crosslinking temperature.

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11. A method for determining the effect of at least one component of a coating composition on a coating composition comprising the steps of

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I) preparing at least two different dye-containing films from at least one polymer or polymer-forming component, and a dye, and

II) determining one or more physical properties selected from the group consisting of degree of crosslinking, relative degree of crosslinking, solvent resistance, crosslinking temperature,

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by

II a) overlaying at least two of the at least two different dye-containing films with an organic solvent thereby eluting at least a portion of the dye and,

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II b) characterizing the amount of dye in the at least two eluates by an absorption or fluorescence measurement.

12. The method of Claim 11 wherein the at least two different films are prepared under at least two different environmental conditions.

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13. The method of Claim 11 wherein the two different environmental conditions are different temperatures.

14. The method of Claim 11 wherein the at least two different films are overlayed with substantially the same volume of organic solvent.

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15. The method of Claim 11 wherein the at least two different films are overlayed for substantially the same amount of time.

16. The test method of Claim 11 wherein the sample vessels
5 have a substantially planar base.

17. The method of Claim 11 wherein the preparation vessel and/or the sample vessel is a microtiter plate.

10 18. The method of Claim 11 further comprising
III) selecting the at least one polymer or polymer forming component that forms the film with the most favorable properties.

15 19. The method of Claim 11 wherein the component of a coating composition comprises a polymer, a crosslinker, a catalyst, a wetting agent, a stabilizer, a levelling agent, an antioxidant, or a plasticizer.

20 20. The method of Claim 11 wherein the dye comprises a fluorescent polyaromatic hydrocarbon or a derivative of a polyaromatic hydrocarbon and the dye does not react with NCO, OH, amide, thiol, COOH, SO₃H or phosphate groups.

25 21. The method of Claim 11 wherein in the preparation step I) the at least one polymer forming component is a powder.

22. The method of Claim 11 wherein the preparation step I) comprises
Ia) preparing at least one solution comprising one or more
30 polymer or polymer-forming component in at least one preparation vessel,

- lb) introducing an amount of the at least one solution into at least two sample vessels, and
- lc) forming a polymer film having a film thickness of less than 500 μm .

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23. The method of Claim 22 wherein the preparation step l) further comprises exposing at least one sample vessel to an increased temperature of at least 50°C.

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24. The method of Claim 22 wherein the sample vessels have substantially the same shape.

25. The method of Claim 22 wherein the sample vessels have a substantially planar base.

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26. The method of Claim 22 comprising metering the solution volumetrically into the sample vessels from the preparation vessel.

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27. The method of Claim 22 comprising metering the solution into the sample vessels from the preparation vessel in parallel.

28. The method of Claim 22 wherein the preparation vessel and/or the sample vessel is a substrate having a large number of depressions.

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29. The method of Claim 22 wherein the preparation vessel and/or the sample vessel is a microtiter plate.

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30. The method of Claim 22 wherein at least two sample vessels comprise a solution or a powder having substantially identical composition.